

Claims

- [c1] 1. An electrically operated system for extending and retracting a room relative to a containment wall, said system comprising:
- a plurality of linear actuators adapted to be combined with the room at points where force is to be applied to move the room;
 - an electrical motor operatively connected to and powering each of the linear actuators;
 - a sensor for detecting movement of the room at each point where force is being applied to move the room, each of said sensors providing a signal related to movement of the room; and
 - a control system combined with the motors for processing the signals from the sensors to control operation of each motor and thereby synchronize movement of the room.
- [c2] 2. The electrically operated system of claim 1 for extending and retracting a room relative to a containment wall in which there is:
- a counter for receiving the signal from each sensor; and
 - a control processor for comparing the counted signals from the sensors and stopping an electric motor powering an actuator at one point if the counted signals from a sensor at that point exceed those from another sensor, the processor restarting the motor when the counted signals from all points again become equal.
- [c3] 3. An electrically operated system for extending and retracting a room relative to a containment wall, said system comprising:
- a plurality of tracks adapted to be combined with the room at points where force is to be applied to move the room;
 - a plurality of compressive load bearing chains, one moveable in each of said tracks, each of said chains having a first end and a second end, said chain first ends being fixed to said containment wall;
 - a plurality of linear actuators each of said linear actuators having an operating rod connected to a respective one of said chain second ends;
 - an electrical motor operatively connected to and powering each of the linear actuators;

a sensor for detecting movement of each of the chains and providing a signal related to movement of the chain; and
a control system combined with the motors for processing the signals from the sensors to control operation of each motor and thereby synchronize movement of the chains.

[c4] 4. The electrically operated system of claim 3 for extending and retracting a room relative to a containment wall in which there is:
a counter for receiving the signal from each sensor; and
a control processor for comparing the counted signals from the sensors and stopping an electric motor powering an actuator at one point if the counted signals from a sensor at that point exceed those from another sensor, the processor restarting the motor when the counted signals from all points again become equal.

[c5] 5. The electrically operated system of claim 4 for extending and retracting a room relative to a containment wall in which the chains move on rollers, and the sensors are infrared sensors that detect passage of a roller by the sensor.

[c6] 6. The electrically operated system of claim 3 for extending and retracting a room relative to a containment wall in which the linear actuators are mounted transversely to the direction of movement of the room, and each of said tracks have a bend formed therein for connection with a respective linear actuator, said bends having a guide to restrain said chains from pulling away from the room.

[c7] 7. The electrically operated system of claim 3 for extending and retracting a room relative to a containment wall in which there is:
a counter for receiving the signal from each sensor; and
a control processor for comparing the counted signals from the sensors and stopping an electric motor powering an actuator at one point if the counted signals from a sensor at that point exceed those from another sensor, the processor restarting the motor when the counted signals from all points again become equal.

- [c8] 8. The electrically operated system of claim 7 for extending and retracting a room relative to a containment wall in which the chains move on rollers, and the sensors are infrared sensors that detect passage of a roller by the sensor.
- [c9] 9. A method for moving a room relative to a containment wall, said system comprising:
commencing movement of the room relative to the containment wall by controlled movement of the room using forces applied at more than one portion of the room;
as the room moves, sensing the amount of movement of the room at each place where the forces are being applied;
producing a signal related to the amount of movement sensed at each place where the forces are being applied; and
controlling movement of the room at each place where the forces are being applied in response to the signals so as to synchronize movement of the room and thereby provide for smooth, non-binding movement of the room.
- [c10] 10. The method of claim 9 further comprising the steps of:
counting the signals from each place where the forces are being applied;
comparing the counted signals from each place where the forces are being applied;
stopping the application of force at a place if the counted signals from that place exceed those from another place; and
resuming the application of force when the counted signals from all places again become synchronized.
- [c11] 11. The method of claim 10 further comprising the steps of stopping the application of force at all places where the forces are being applied if the counted signals do not return to a synchronized state within a predetermined time.
- [c12] 12. The method for extending and retracting a room relative to a containment wall, said system comprising:
applying forces using two or more linear actuators connected at two or more portions of the room to move the room relative to the containment wall;

as the room moves, sensing the amount of movement of the room at each place where the forces are being applied;
producing a signal related to the amount of movement sensed at each place where the forces are being applied; and
controlling the force applied by each actuator in response to the signals so as to synchronize movement of the room and thereby provide for smooth and non-binding extension of the room.

[c13] 13. The method of claim 12 further comprising the steps of:
counting the signals from each place where the forces are being applied;
comparing the counted signals from each place where the forces are being applied;
stopping the application of force by a linear actuator at a place if the counted signals from that place exceed those from another place by a predetermined amount; and
resuming the application of force by the linear actuator when the counted signals from all places again become synchronized.

[c14] 14. The method of claim 13 further comprising the steps of stopping the application of force by the linear actuators at all places where the forces are being applied if the counted signals do not return to a synchronized state within a predetermined time.